Claims 13-15 stand rejected as being obvious over Clawson in view of Narumiya et al, further in view of Setzer et al '484 and still further in view of Sheller.

Claims 1-4, 7-9 and 22 stand rejected as being obvious over the combination of Clawson in view of Narumiya et al and further in view of Setzer et al '578.

Claims 21 and 23 stand rejected as being obvious over Setzer '578 in view of Narumiya et al.

Claims 1-5, 8-18 and 20-23 stand provisionally rejected under 35 USC§101 as claiming the same invention as Claims 1-5 and 8-22 of co-pending application USSN 09/321,390.

Claims 6 and 7 stand provisionally rejected under the judicially created doctrine of obviousness double patenting as being unpatentable over the subject matter of Claims 6 and 7 of co-pending application USSN 09/321,390 in view of Jenkins.

Claim 19 stands provisionally rejected under the judicially created doctrine of obviousness double patenting as being unpatentable over the subject matter of Claim 1 of co-pending application USSN 09/321,390 in view of Clawson.

All of the claims, as originally filed, stand rejected. The claims have been amended to clarify the fact that they refer to a methanol and/or ethanol fuel gas autothermal reformer.

OBJECTIONS TO THE SPECIFICATION

The Examiner has objected to the specification due to the alleged use of the phrase "catalyzed cells" (page 2, OA) throughout the specification. The specification has been amended to clarify the fact that the phrase "catalyzed cells" as used in this application refers to cells in the foam catalyst bed on which a catalyst or catalysts are deposited.

OBJECTIONS TO THE DRAWINGS

The drawings have been objected to for a number of reasons. The Examiner states that a high temperature-compatible metal support is not shown in the drawings, and that a source of electrical current connected to the support is not shown in the drawings. FIG. 1 has been amended to show the electrical current source, and the foam support is certainly shown in the drawings. It is the catalyst bed, and it is identified by the numeral 2. The tendrils 4 are clearly indicated on the substitute FIG. 1. There are no longer plural numerals 8 on the substitute FIG. 1, thus the "end 8" is clearly shown in the drawing. The reference numeral 10 clearly points to the opposite end of the catalyst bed from the end 8. We would advise the Examiner to pay close attention to the specification when interpreting what the drawings show. If the specification states that the numeral 10 refers to one end of the bed 2 and the numeral 8 refers to the opposite end of the bed 2, then the Examiner has no standing to dispute this fact. The fact that the numeral 8 is clearly identified in the specification as indicating the inlet end of the bed 2 belies the veracity of the Examiner's argument that the fact that the lead line in FIG. 2 ends up perhaps 1/16th of an inch inside of the inlet end of the catalyst bed 2 obfuscates what the numeral 8 refers to.

The specification has been amended to refer to the letter D which is shown in FIG. 2 of the drawings. The reference numerals 2 and 10 do not refer generally to the catalyst bed. The drawings must be interpreted in light of the specification. If the specification states that the numeral 10 refers to one end of the catalyst bed, and that the numeral 2 refers to the catalyst bed in general, then that's what they refer to.

Correction of the drawings as regards the numerals 2, 8 and 10 and their respective lead lines is not required.

In summary, regarding the Examiner's comments relating to the drawings, the tendrils 4 have been identified in the newly submitted FIG. 1. A source of electrical energy (a battery 5) has been added to FIG. 1. A specific reference to the letter D has been added to the specification. The remaining objections to the drawings are not well taken and should be withdrawn.

OBJECTIONS TO THE CLAIMS

The various objections to the claims have been addressed by amendments to the claims, and have thus been rendered moot.

THE 35 USC §112, SECOND PARAGRAPH REJECTIONS:

The §112 rejections will be addressed hereinafter in the order presented by the Examiner, beginning with Para. 8 on page 4 of the office action.

8) The rejections of Claims 1 and 21-23 are based on the allegation that the inclusion of the phrase "is operable" renders the claims indefinite. Claim 21 has been canceled without prejudice, thereby rendering the rejection of this claim moot. The Examiner uses the phrase "passive voice" in formulating the rejection. We do not know what a "passive voice" is, however, we submit that the recitation of functions of a claimed structure does not render the claims indefinite in and of itself. The Court of Customs and Patent Appeals has stated in In re Miller, 169 USPQ 597, at 599 (CCPA 1971) that: "there is no merit in any proposition which would require the denial of the claim solely because of the type of language used to define the subject matter of which patent protection is sought.". Thus, in the case of an apparatus claim, the use of a functional "type of language" cannot, per se, and without more, support a rejection of that claim under the statute. Note that the Court used the phrase "**any proposition**".

See also: In re Swinehart, 169 USPQ 226, at 228 (CCPA 1971) wherein the Court stated that the word "Functional" indicates nothing more than the fact that an attempt is being made to define something by what it does rather than by what it is. The Court found nothing intrinsically wrong with the use of such a technique in drafting patent claims. See also: In re Benson, 164 USPQ 22 (CCPA 1969); ZMI Corp. v. Cardiac Resuscitator Corp., 6 USPQ 2nd 1557 (Fe. Cir. 1988); and Intel Corp. v. U.S. International Trade Commission, 20 USPQ 2nd 1161 (Fed. Cir. 1991).

In In re Halleck, 164 USPQ 647 (CCPA 1970), the Court specifically recognized the practical necessity of using functional language in patent claims.

If there is a catalyst in an inlet portion of the catalyst bed which causes combustion of a portion of the fuel gas, then the claims cover such a structure, assuming that all other claim limitations are met. If there isn't, then the claims don't cover such a structure. It's that simple. One skilled in the art would certainly know if he or she were or were not using a noble metal catalyst which combusts the fuel gas at the recited temperatures. This rejection is erroneous and should be withdrawn.

Claims 1 and 22 and 23 are alleged to be indefinite due to the recitation of "the fuel gas" in line 4 of these claims. With all due respect the thrust of this entire invention relates to the reforming of a "fuel gas". The phrase "fuel gas" has been amended in the claims to "fuel gas stream", and the phrase "fuel gas stream" has been inserted into the preamble of each of these claims. This rejection was not well taken in the first place, and has been specifically addressed by amendment of these claims. Therefore, this rejection should be withdrawn.

The term "minimizing" has been deleted form Claims 1, 22 and 23 and replaced by the term "inhibiting". This rejection has thus been rendered moot.

The Examiner rejects Claims 1, 22 and 23 as being indefinite due to the recitation of the phrase "catalyzed cells" in these claims. The specification has been amended to clarify what the subject phrase refers to, thereby rendering this rejection moot.

The word "core" has been deleted from Claims 1, 22 and 23, thereby rendering the rejection moot which was based on the claim limitation "said foam core".

Referring to Claims 1 and 22, the Examiner states that the term "whereby" cannot be relied upon to distinguish claimed subject matter from prior art and thus can be ignored in the patentability analysis, citing In re Mason. This argument is flawed. In determining anticipation, functional language, preambles, and language in "whereby", "thereby", and "adapted to" clauses cannot be disregarded. Pac-Tec, Inc. v. Amerace Corp., 14 USPQ2d 1871 (CAFC 1990). Claim limitations cannot be ignored by an

Examiner. Furthermore, whether claim limitations can or cannot "serve to distinguish" is not relevant in the context of a §112, second paragraph rejection.

The Examiner states that Claims 1 and 22 are indefinite due to the inclusion of the phrase "will be" in the claims. The phrase "will be" has been replaced with the word "is", thereby rendering this rejection moot.

Claims 1 and 22 have been amended to render moot the rejection based on the inclusion of the phrase "the processed gas stream" in these claims.

Regarding Claim 2 and the inclusion of the term "catalyst", Claim 1 has been amended to include the term "catalyst" thereby rendering moot the rejection of Claim 2.

Claim 6 has been canceled and Claim 7 has been amended, thereby rendering moot the rejections of these claims found on page 6 of the office action.

Claim 8 has been canceled thus rendering moot the rejections of this claim in the office action.

The rejection of Claim 15 is based on the Examiner's allegation that the language of Claim 15 is merely functional, and therefore renders the claim's scope "unclear" to the Examiner. Whether a claim is unclear to an Examiner is irrelevant under §112, 2nd paragraph. Regarding the use of functional language in a claim, see: In re Swinehart, 169 USPQ 226, at 228 (CCPA 1971) wherein the Court stated that the word "Functional" indicates nothing more than the fact that an attempt is being made to define something by what it does rather than by what it is. The Court found nothing intrinsically wrong with the use of such a technique in drafting patent claims. See also: In re Benson, 164 USPQ 22 (CCPA 1969); ZMI Corp. v. Cardiac Resuscitator Corp., 6 USPQ 2nd 1557 (Fed. Cir. 1988); and Intel Corp. v. U.S. International Trade Commission, 20 USPQ 2nd 1161 (Fed. Cir. 1991). In In re Halleck, 164 USPQ 647 (CCPA 1970), the Court specifically recognized the practical necessity of using functional language in patent claims. This rejection is thus traversed and should be

withdrawn.

The cancellation of Claim 8 and the amendment of Claim 9 has rendered the two rejections of Claim 9 moot. This rejection should thus be withdrawn.

The rejection of Claims 10 and 11 have been rendered moot since these claims have been canceled.

The first rejection of Claim 13 has been addressed by amending the claim so as to clarify the temperatures involved. The Examiner has asked what specific property should the metal support have in order to be compatible with operating temperatures simply means that the support should be stable, not expand too much or contract too much, or warp, at operating temperatures, and certainly not melt at operating temperatures. Once again, the Examiner is substituting his or her knowledge of the degree of autothermal component operating temperature compatibility for the knowledge of one skilled in the art of autothermal reforming of methanol or ethanol fuels. The preferred range of operating temperatures for an ethanol or methanol autothermal reformer assembly is clearly set forth in the specification of this application. The test for §112, paragraph 2 compliance is not what is clear to a patent examiner, but what is clear to one of skill in the art in question.

The amendment of Claim 14 which changes its dependency has rendered the rejections of Claims 14 and 15 moot.

The Examiner alleges that the phrase "fuel gas" in Claim 19 does not have sufficient antecedence and therefore, apparently renders the claim vague and indefinite. Claim 19 depends from Claim 1. The first line of Claim 1 recites "fuel gas". This rejection is thus clearly erroneous and should be reconsidered and withdrawn.

The word "quick" has been deleted from Claims 22 and 23 thereby rendering the rejection of these claims based on the inclusion of this term moot.

In Claims 22 and 23 the term "reformer" has been amended to recite the phrase "reformer assembly", thereby rendering the rejection of these claims for lack of antecedence moot.

9) Claims 1-23 have been rejected under §112, second paragraph as being incomplete, the Examiner citing MPEP § 2172.01 as supporting this rejection. The Examiner states that the claims in question are "incomplete for omitting essential structural **cooperative (sic 'co-operative') relationships** of elements" (emphasis added). The section of the MPEP cited by the Examiner refers to the lack of essential co-operative relationships of elements in a claim as supporting a §112, first paragraph rejection, not a §112, second paragraph rejection. Thus the Examiner seems to be confusing the two paragraphs of §112 and the guidance provided by the cited section of the MPEP. In any event, Applicants traverse the grounds for this rejection.

Specifically, regarding Claims 1, 20, 22 and 23, the Examiner seems to be alleging that one skilled in the art in question would be unaware of the meaning of the phrase "being provided with"; and also unaware of the meaning of the term "deposited", which should really be "deposited in". Has the Examiner bothered to consult a dictionary as to the meaning of the term "provided"? It is synonymous with the word "supplied". Does the Examiner seriously contend that one skilled in the art in question would not understand what the phrase "deposited in" means? The Examiner has suggested that certain structural features of the catalyst bed would be necessary to allow the foam catalyst bed to be provided with a first catalyst, and to allow the catalyst bed to have a fuel gas reforming catalyst deposited on it. **What are these necessary structural features?**

Regarding Claims 1 and 22, the allegations that the phrase "being disposed in heat exchange relationship" is not a positive structural recitation is ridiculous. Has the Examiner ever put his or her hand on something hot or cold? If he or she has, then the hand was in a "heat exchange relationship" with the hot or cold something. Heat exchange relationship simply means that heat can be transferred from something to

something else due to the physical relationship between the something and the something else. Understanding a heat transfer relationship is not rocket science.

The Examiner is, in effect, characterizing one skilled in the art of hydrocarbon fuel gas autothermal reforming as an idiot, in some respects in the aforesaid rejections. The Examiner **must always bear in mind** when postulating §112, 2nd paragraph rejections of claims, the test is: What would one skilled in the art in question understand the claims to circumscribe?

We have gone to great lengths here to address all of the §112, second paragraph rejections, some of which are well grounded, but many of which are not well grounded.

THE 35 USC §103 REJECTIONS

11) Claim 20 stands rejected as being obvious over the combination of Clawson and Narumiya et al. Clawson discloses a catalytic steam reformer and Narumiya et al discloses a catalytic converter for purifying burner exhaust gases. The Clawson reference uses a noble metal and/or nickel catalyst which is supported on a refractory carrier, the physical nature of which is not explained, except that it must be supported and confined by perforate screens. The Narumiya et al reference describes a ceramic foam support which has an activated alumina coating on it wherein the alumina coating is covered by a noble metal oxidizing catalyst. The smelly components and the CO in the burner exhaust being purified are oxidized, or burned, in the catalyst bed. The motivation put forth by the Examiner for substituting the Narumiya et al catalyst bed for the Clawson catalyst bed is to provide a catalyst bed which allows the fuel gas to always be in contact with the surface of the catalyst, to accelerate gas diffusion, and to prevent the direct passage of unreacted gas. It would appear that none of these problems exist in the Clawson reformer, and thus there is no motivation to substitute the Narumiya et al catalyst bed for the Clawson catalyst bed. Furthermore, one would not be likely to use an oxidizing catalyst bed in a steam reformer for a hydrocarbon fuel gas. If one did make such a substitution, the result would be to oxidize or burn all of the hydrocarbons in the fuel gas, which would be an undesirable in a steam reformer. Furthermore, Claim 20 has been amended to recite

the inclusion of an inlet section noble metal catalyst and a subsequent copper and/or zinc catalyst in the catalyst bed which are used to reform the methanol fuel gas stream. This catalyst combination is not found in either Clawson or Narumiya et al. This rejection of Claim 20 should therefore be reconsidered and withdrawn.

12) Claims 1-6, 10-12 and 16-19 stand rejected as being obvious over the combination of Clawson and Narumiya et al in view of Setzer et al '484. Since Claims 3-6, 10 and 11 have been canceled with prejudice, this rejection can be reformulated to read Claims 1, 2, 12, and 16-19 as the subject of this rejection.

The Examiner's characterization of details of the Clawson structure is incorrect. The fuel gas inlet line in Clawson is denoted by the numeral 219, not 208. The numeral 208 denotes the initial portion of the catalyst bed and is filled with a catalyst 214. The fuel comes from a source 217, passes through the line 219 and enters the initial portion 208 of the catalyst bed. Oxygen (air) enters the reformer 200 through a line 235 from an oxygen source 242. The air passes through a helical tube 232 which is disposed in an annular chamber which doesn't seem to numbered. The partially reformed gas stream passes through the annular chamber and then passes into a second catalyst bed 262. Thus, the air stream in the helical tube 232 is disposed in heat exchange relationship with the partially reformed gas stream, but the fuel gas inlet passage 219 is not disposed in heat exchange relationship with the partially reformed gas stream. Thus, preheating of the fuel gas stream, as claimed in this application, does not occur in Clawson.

We agree that Setzer et al '484 describes an autothermal reformer with a two stage catalyst bed. We do not agree that Setzer et al '484 describes a foam catalyst bed as implied on page 11 of the office action. Setzer et al clearly describes a pelletized catalyst bed. See Claim 2 of Setzer et al.

The rejections of Claims 1, 2, 12 and 16-19 contained in section 12 of the office action are thus flawed since they are based on an erroneous interpretation of the principal reference, Clawson. The claims in question have been amended to recite specific

catalysts, which are not suggested in the cited combination of prior art. The Examiner refers to the need for "unexpected results" stemming from the claimed subject matter in order to overcome an allegation of obviousness. There is no requirement for unusual, unexpected or surprising results in Title 35 of the patent statute. See: Kansas Jack, Inc. v Kuhn et al 219 USPQ 857 (CAFC 1983). This rejection should thus be reconsidered and withdrawn.

13) Claims 13-15 stand rejected as being obvious over the combined teachings of Clawson in view of Narumiya et al and Setzer et al '484, and further in view of Sheller. The Examiner characterizes the Sheller reference as disclosing a "monolithic" catalyst bed. This is not correct. The Sheller catalyst bed is formed from a plurality of corrugated metal strips, and is not a one-piece (monolithic) member. The rejected claims are all dependent from Claim 1, and thus include all of the limitations of Claim 1. As noted above in connection with section 12 of the office action, the Examiner's analysis of the Clawson reference is erroneous, thus this rejection is also based on an erroneous interpretation of Clawson. The amendment of Claim 1 further limits Claims 13-15 in a manner which is not suggested in any of the cited references. This rejection should thus be reconsidered and withdrawn.

14) Claims 1-4, 7-9 and 22 stand rejected as being obvious over the combined teachings of Clawson in view of Narumiya et al and further in view of Setzer et al '758. Claims 3, 4 and 8 have been canceled without prejudice, thus this rejection can be reformulated to a rejection of Claims 1, 2, 7, 9 and 22. In formulating this rejection, the Examiner makes repeated reference to the presence or absence of "unexpected results" springing from the claimed invention. Regarding the need for "unexpected results", we reiterate our arguments put forth above, to wit, the Examiner refers to the need for "unexpected results" flowing from the claimed subject matter in order to overcome an allegation of obviousness. There is no requirement for unusual, unexpected or surprising results in Title 35 of the patent statute. See: Kansas Jack, Inc. v Kuhn et al 219 USPQ 857 (CAFC 1983). The Examiner's continued and repeated reliance on such a requirement is clearly erroneous, and should be put aside.

One further point regarding the stated rejections relates to the Examiner's continued references to the supplemental references Jenkins and Peters which have not been specifically included in the grounds for the rejection. If the Examiner intends to rely on these two references, then the Examiner should present a cogent analysis of these references which is as specific as the analysis of the Clawson, Narumiya et al and Setzer et al '578 references.

In supporting this rejection of Claim 1, the Examiner refers back to the reasons for rejecting Claim 20 which are noted above. In response thereto, we will reiterate our argument relating to the rejection of Claim 20 and re-direct it to the subject matter of Claim 1. Clawson discloses a catalytic steam reformer and Narumiya et al discloses a catalytic converter for purifying burner exhaust gases. The Clawson reference uses a noble metal and/or nickel catalyst which is supported on a refractory carrier, the physical nature of which is not explained, except that it must be supported and confined by perforate screens. The Narumiya et al reference describes a ceramic foam support which has an activated alumina coating on it wherein the alumina coating is covered by a noble metal oxidizing catalyst. The smelly components and the CO in the burner exhaust being purified are oxidized, or burned, in the catalyst bed. The motivation put forth by the Examiner for substituting the Narumiya et al catalyst bed for the Clawson catalyst bed is to provide a catalyst bed which allows the fuel gas to always be in contact with the surface of the catalyst, to accelerate gas diffusion, and to prevent the direct passage of unreacted gas. It would appear that none of these problems exist in the Clawson reformer, and thus there is no motivation to substitute the Narumiya et al catalyst bed for the Clawson catalyst bed. Furthermore, one would not be likely to use an oxidizing catalyst bed in a steam reformer for a methanol or ethanol fuel gas. If one did make such a substitution, the result would be to oxidize or burn all of the hydrocarbons in the fuel gas, which would be an undesirable in a steam reformer. Furthermore, Claim 1 has been amended to recite the inclusion of an inlet section noble metal catalyst and a subsequent copper and/or zinc catalyst in the catalyst bed which are used to reform the methanol or ethanol fuel gas stream. This catalyst combination is not found in either Clawson or

Narumiya et al.

The only reference of the three, or perhaps five, references relied upon by the Examiner that suggests any start-up temperature for a reformer is the Setzer et al '578 reference which suggests in FIG. 3 a start-up temperature of about 1,250°F. The Setzer et al '578 reference system is thus apparently not able to operate at a system start-up temperature of 500°F, or anything even close thereto. Claim 22 recites a start-up temperature of 200°F which is likewise not suggested in any of the references relied upon by the Examiner.

As noted above the Examiner's analysis of Clawson is flawed, and the analysis of the start-up temperature suggested in Setzer et al '578 is likewise flawed. This rejection should therefore be reconsidered and withdrawn.

15) Claim 23 stands rejected as being obvious over the combination of Setzer et al '578 in view of Narumiya et al. The Examiner also refers to a Peters '780 reference, but does not explicitly rely on that reference in the rejection. Regarding Claim 23, the claim requires combustion of a portion of the fuel gas at a temperature of about 200°F to enable start-up of the reformer assembly. We have carefully reviewed the Examiner's reasoning for finding the 200°F start-up temperature somewhere in the combination of the references, but are at a loss to understand where the Examiner finds this start-up temperature, other than in the instant application. The only reference in the three, or perhaps four, references relied upon by the Examiner that suggests any start-up temperature for a reformer is the Setzer et al reference which suggests in FIG. 3 a start-up temperature of about 1,250°F. The Setzer et al reference system is thus apparently not able to operate at a system start-up temperature of 200°F, or anything even close thereto. The grounds for rejecting this claim are thus flawed, and the rejection should be reconsidered and withdrawn.

THE 35 USC §101 REJECTIONS

Claims 1-5, 8-18 and 20-23 have been provisionally rejected under §101 of the statute

on the grounds that they claim the same invention as that claimed in Claims 1-5 and 8-22 of co-pending application SN 09/321,390. It is noted that in order for a provisional §101 double patenting rejection to be upheld, the subject matter of the claims in question from application A must infringe the subject matter of the claims in question from application B, and vice versa. Thus claims from A must infringe claims from B, and claims from B must infringe claims from A. Otherwise, a §101, same invention double patenting rejection, will not lie. In the instant application, the aforesaid double patenting rejection can be distilled to a rejection of Claims 1, 2, 9, 12-18, 20, 22 and 23, since the other claims in the rejected group have been canceled without prejudice. Of the remaining rejected claims, Claims 1, 20 and 22 are the only independent claims. Thus the claims which precede Claim 22 all include the limitations of Claim 1 or Claim 20. Claims 1 and 20 have been amended to include the presence of a copper and/or a zinc catalyst in the catalyst bed. This limitation is not found in any of Claims 1-5 and 8-22 of the co-pending patent application. Thus the invention described in Claims 1-5 and 8-22 of the co-pending patent application could be infringed by the use of catalyst in the second region of the catalyst bed which is not a copper and/or a zinc catalyst, while Claims 1, 2, 9, 12-18 and 20 of the instant application could not be so infringed. Thus, the amendment of Claims 1 and 20 has rendered moot the provisional §101 double patenting rejection of Claims 1, 2, 9, 12-18 and 20 of this application. Claim 22 of the instant application requires the inclusion of a noble metal catalyst which can cause combustion of methanol at a temperature of about 200°F. Of Claims 1-5 and 8-22 in the co-pending application, only Claims 21 and 22 recite a combustion temperature, and that temperature is 500°F. Thus the claims of the co-pending patent application could be infringed by the use of a catalyst which would not cause combustion of methanol at a temperature of 200°F, while Claim 22 of the instant application could not be so infringed. Thus the §101 rejection of Claim 22 is not well taken and should be withdrawn.

THE OBVIOUSNESS-TYPE DOUBLE PATENTING REJECTIONS

Claims 6 and 7 have been provisionally rejected under the judicially created doctrine of double patenting as being obvious over the subject matter of Claims 6 and 7 of the co-pending patent application in view of Jenkins. Claim 19 has been provisionally

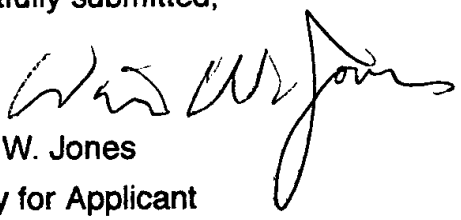
rejected under the judicially created doctrine of double patenting as being obvious over the subject matter of Claim 1 of the co-pending application, in view of Clawson. These rejections can be addressed by means of a terminal disclaimer should such a procedure be called for. In the meantime, any definitive response to the obviousness type double patenting rejections will be held in abeyance until such time that one of the patent applications is allowed.

SUMMARY

As noted above, none of the claims have been allowed and the rejections of all of the claims, save Claims 3-6, 8, 10, 11 and 21, which have been canceled, have been addressed and/or traversed. The objections to the claims, specification and drawings have been addressed, and should be withdrawn. As noted above, a new drawing sheet is enclosed herewith.

In view of the amendments to the claims, and the arguments advanced in support thereof, it is respectfully submitted that the remaining claims are allowable over the art that has been cited and applied by the Examiner in this application. Early notice to that effect is courteously requested.

Respectfully submitted,



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